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Indian Standard

CASTORS AND WHEELS — VACABULARY, SYMBOLS AND MULTILINGUAL TERMINOLOGY

ICS 53.100

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2011 **Price Group 8**

Material Handling Systems and Equipment Sectional Committee, MED 07

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 22877 : 2004 'Castors and wheels — Vocabulary, symbols and multilingual terminology' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Material Handling Systems and Equipment Sectional Committee and approval of the Mechanical Engineering Division Council.

This standard supersedes IS 6839 (Part 1) : 1994 'Glossary of terms related to non-powered materials handling equipment: Part 1 Castors and wheels'.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Only English language text has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the ISO Standard.

Indian Standard

CASTORS AND WHEELS — VACABULARY, SYMBOLS AND MULTILINGUAL TERMINOLOGY

Scope

This International Standard defines terms and symbols relating to castors and wheels.

NOTE 1 "Castors and wheels" is the English expression; in other languages the expression may be reversed, for example in French "Roues et roulettes".

NOTE 2 In addition to terms in English and French (two of the three official ISO languages), this International Standard gives the equivalent terms in German, Finnish, Italian, Dutch and Swedish; these are published under the responsibility of the member bodies for Germany (DIN), Finland (SFS), Italy (UNI), Netherlands (NEN) and Sweden (SIS). However, only the terms and definitions given in the official languages can be considered as ISO terms and definitions.

1 Definitions relating to wheels

1.1 Wheels and their constituent parts

1.1.1

wheel

circular structure able to rotate on an **axle** (2.1), either directly or with the use of **bearing**(s) (1.1.8), with the external part in contact with the ground

See Figure 1.

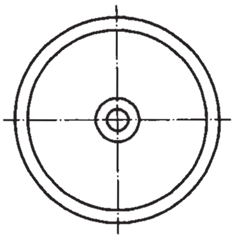


Figure 1 — Wheel

1.1.2

hub

central part of the wheel to receive the **axle** (2.1) or the **bearing**(s) (1.1.8)

See Figure 2.

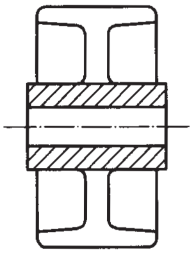


Figure 2 — Hub

1.1.3

rim

outer profile of the **wheel centre** (1.1.5)

See Figure 3.

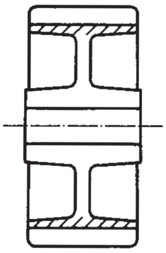


Figure 3 — Rim

1.1.4

connecting flange

part of the wheel between the **hub** (1.1.2) and the **rim** (1.1.3)

See Figure 4.

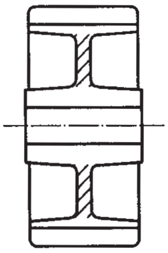


Figure 4 — Connecting flange

1.1.5

wheel centre

part of the wheel comprising the **hub** (1.1.2), **connecting flange** (1.1.4) and **rim** (1.1.3), suitable to receive a **tyre** (1.1.6)

See Figure 5.

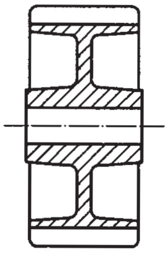


Figure 5 — Wheel centre

1.1.5.1

solid wheel centre

wheel centre (1.1.5) made from only one material

1.1.5.2

composite wheel centre

wheel centre (1.1.5) made from assembled parts

1.1.6

tyre

outer part of a wheel, produced from different material from the **wheel centre** (1.1.5)

1.1.6.1

solid tyre

tyre (1.1.6) not containing air

1.1.6.2

semi-pneumatic tyre

tyre (1.1.6) with cavity containing air at a pressure which cannot be adjusted

1.1.6.3

foam tyre

tyre (1.1.6) having an open or closed cellular structure

1.1.6.4

pneumatic tyre

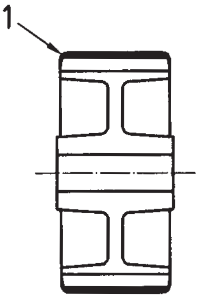
tyre (1.1.6) suitable for containing air at a pressure which can be adjusted

1.1.7

tread

outer surface of a wheel or a **tyre** (1.1.6), in contact with the ground

See Figure 6.



Key

1 tread

Figure 6 — Tread

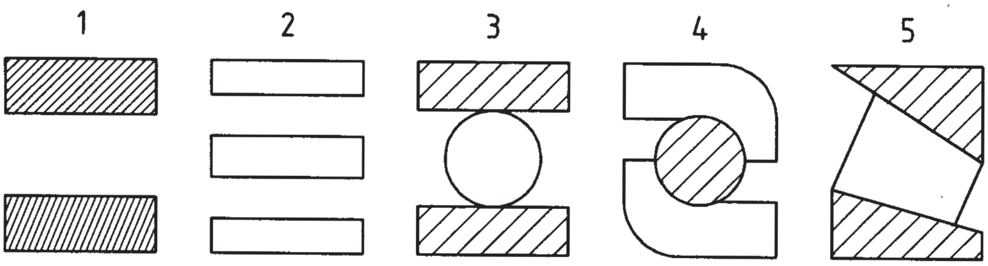
1.1.8

bearing

device(s) intended to ease the rotation of a wheel around its **axle** (2.1)

EXAMPLES Sleeve and self-lubricated plain bearings, ball bearings, roller bearings, tapered roller bearings.

See Figure 7.



Key

1	plain bearing
2	roller bearing
3	ball bearing
4	cone bearing
5	tapered roller bearing

Figure 7 — Bearings

1.2 Construction of a wheel

The following types are examples of the most frequently used wheels as per 1.1.1.

1.2.1

solid wheel

wheel without any added **tyre** (1.1.6)

See Figure 8.

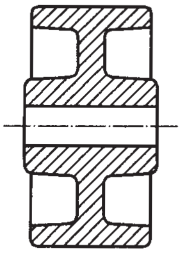


Figure 8 — Solid wheel

1.2.2

composite wheel

wheel comprising a **wheel centre** (1.1.5) and a **tyre** (1.1.6)

1.2.2.1

bonded-tyre wheel

wheel with a **tyre** (1.1.6) permanently fixed to the **rim** (1.1.3)

See Figure 9.

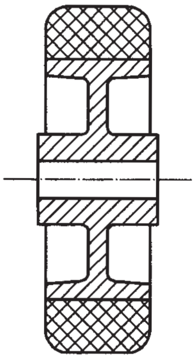


Figure 9 — Bonded-tyre wheel

1.2.2.2

demountable-tyre wheel

wheel with a **tyre** (1.1.6) that is detachable

See Figure 10.

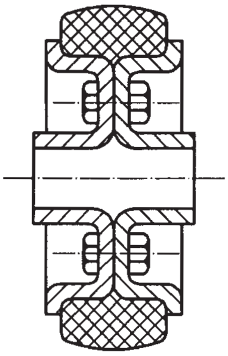


Figure 10 — Demountable-tyre wheel

1.2.2.3

permanently tyred wheel

wheel with a **tyre** (1.1.6) that it is not detachable

See Figure 11.

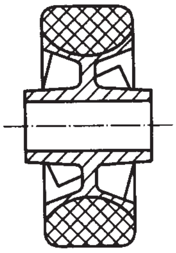


Figure 11 — Permanently tyred wheel

1.2.2.4

press-on-tyre wheel

wheel comprising a **wheel centre** (1.1.5) with a press-on **tyre** (1.1.6)

See Figure 12.

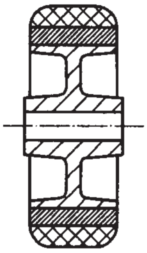


Figure 12 — Press-on-tyre wheel

1.2.3

flange wheel

wheel with a **connecting flange** (1.1.4), suitable for fitting to a **hub** (1.1.2) or stub **axle** (2.1)

See Figure 13.

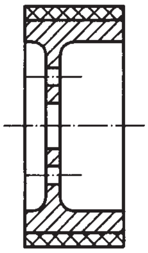


Figure 13 — Flange wheel

1.2.4 Tyred wheels

1.2.4.1

solid-tyred wheel

wheel fitted with a **solid tyre** (1.1.6.1)

See Figure 14.

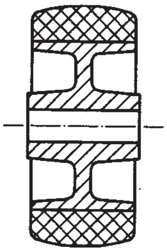


Figure 14 — Solid-tyred wheel

1.2.4.2

semi-pneumatic-tyred wheel

wheel fitted with a **semi-pneumatic tyre** (1.1.6.2)

See Figure 15.

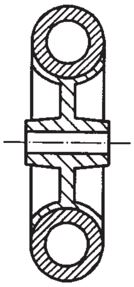


Figure 15 — Semi-pneumatic-tyred wheel

1.2.4.3

foam-tyre wheel

wheel fitted with a **foam tyre** (1.1.6.3)

See Figure 16.

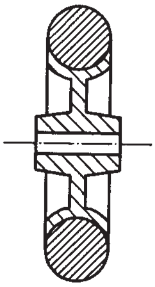


Figure 16 — Foam-tyre wheel

1.2.4.4

pneumatic-tyred wheel

wheel fitted with a **pneumatic tyre** (1.1.6.4)

See Figure 17.

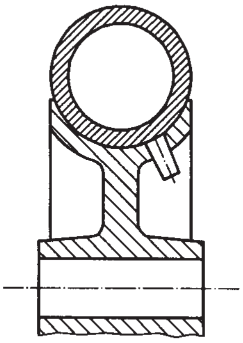


Figure 17 — Pneumatic-tyred wheel

1.2.5

single-flanged rail wheel

wheel designed to run on a rail or guiding track

See Figure 18.

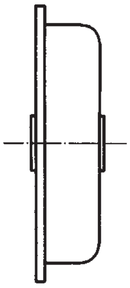


Figure 18 — Single-flanged rail wheel

1.2.6
grooved wheel
wheel designed to run on various rail profiles or used with ropes

See Figure 19.

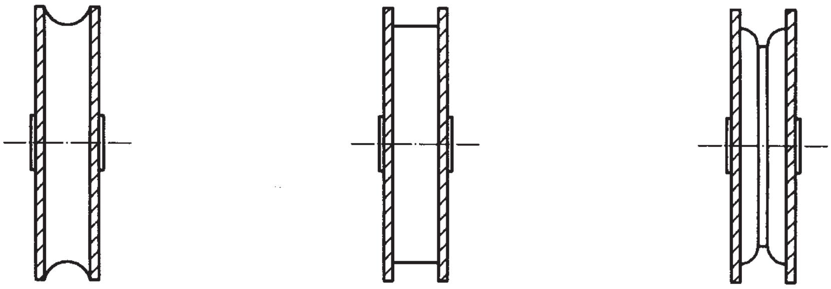


Figure 19 — Grooved wheel

1.2.7 Antistatic and electrically conductive castors or wheels

1.2.7.1
conductive castor or wheel
castor (3.1) or wheel with resistivity not higher than $10^5\ \Omega$

NOTE This castor or wheel does not assure the safety of electrical insulation.

1.2.7.2
antistatic castor or wheel
castor (3.1) or wheel with resistivity higher than or equal to $10^5\ \Omega$ but lower than or equal to $10^7\ \Omega$, capable of dissipating electrostatic charges

1.2.8
flame-retardant wheel
wheel whose components are made of flame-retardant materials

1.2.9
load wheel
wheel which bears the dynamic and static stresses of the vehicle to which it is fitted

1.2.9.1
drive wheel
load wheel (1.2.9) connected, directly or through a clutch, to the power system which transmits the torque necessary for the movement of the vehicle

1.2.9.2
steer wheel
free-running wheel, connected to a steering device that controls the running direction of the vehicle to which it is fitted

1.2.9.3
drive-steer wheel
load wheel (1.2.9) connected to the power systems and to a steering device that performs the duties as in 1.2.9.1 and 1.2.9.2 simultaneously

1.2.10
stabilizer wheel
wheel, solidly or resiliently mounted on the chassis of a vehicle, used to assist in maintaining stability

1.2.11
guide wheel
wheel which controls the movement of the vehicle along a predetermined path

1.3 Dimensional characteristics of the wheel

1.3.1
diameter
D
outer nominal diameter of the wheel

See Figure 20.

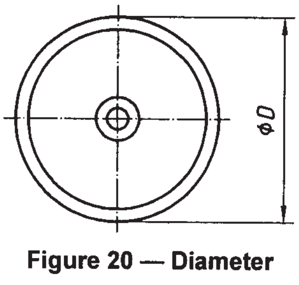


Figure 20 — Diameter

1.3.2
hub diameter

D_M

smallest outer diameter of the **hub** (1.1.2)

See Figure 21.

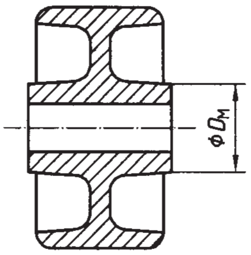


Figure 21 — Hub diameter

1.3.3
bore diameter

D_d

nominal diameter of the hole through the **hub** (1.1.2), or nominal inner diameter of the **bearing**(s) (1.1.8) to receive the **axle** (2.1)

See Figure 22.

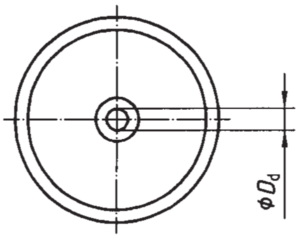


Figure 22 — Bore diameter

1.3.4
bearing seat dimensions

$D_s \times b_t$

nominal diameter, D_s, and depth, b_t, of the seat to receive the **bearing**(s) (1.1.8)

See Figure 23.

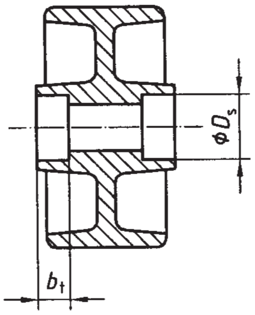


Figure 23 — Bearing seat dimensions

1.3.5
wheel width

b_T

widest part of the wheel, either the **hub width** b_{T1} (1.3.5.1), or **tyre width** b_{T2} (1.3.5.2), or **tread width** b_{T3} (1.3.5.3)

1.3.5.1
hub width

b_{T1}

widest part of the **hub** (1.1.2) including **bearing**(s) (1.1.8) and **threadguards** (3.3.1), if fitted

See Figure 24.

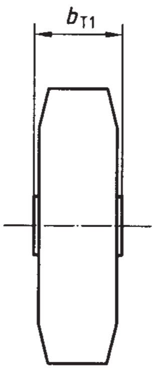


Figure 24 — Hub width

1.3.5.2
tyre width

b_{T2}

width of the **tyre** (1.1.6) measured parallel to the revolving axis

See Figure 25.

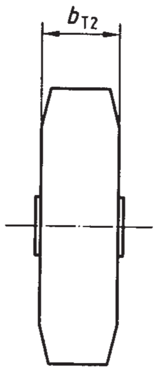


Figure 25 — Tyre width

1.3.5.3
tread width

b_{T3}

width of the **tread** (1.1.7)

See Figure 26.

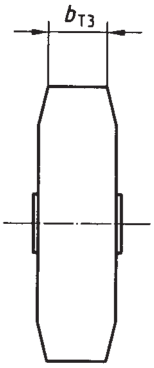


Figure 26 — Tread width

2 Definitions relating to axle and mountings

2.1
axle

component of circular section on which the wheel is free to revolve

2.2 Wheel mountings

2.2.1

fork mounting
assembly to support the **axle** (2.1) on both sides of the **hub** (1.1.2)

See Figure 27.

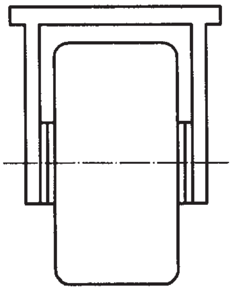


Figure 27 — Fork mounting

2.2.2

stub axle mounting
assembly to support the **axle** (2.1) only on one side of the **hub** (1.1.2)

See Figure 28.

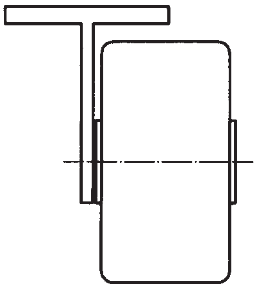


Figure 28 — Stub axle mounting

2.2.3

twin wheel stub axle mounting
assembly to support the **axle** (2.1) only between the wheels

See Figure 29.

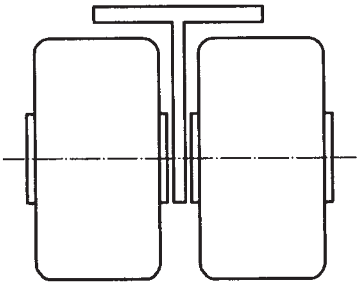


Figure 29 — Twin wheel stub axle mounting

3 Definitions relating to castors

3.1

castor
assembly comprising a **housing** (3.2.1), one or more wheels, an **axle** (2.1) and, if required, **accessories** (3.3)

3.1.1

fixed castor
assembly including one or more wheel(s) on a fixed **housing** (3.2.1)

See Figure 30.

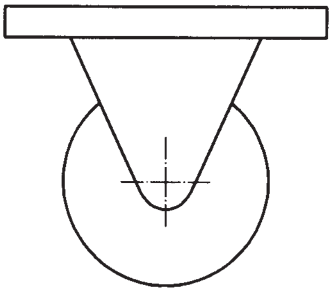


Figure 30 — Fixed castor

3.1.2

swivel castor
assembly including one or more wheel(s) on a **housing** (3.2.1) which rotates freely around a vertical axis

NOTE The axis of the wheel(s) is normally offset to the **swivel axis** (3.2.4) of the **fork** (3.2.2).

See Figure 31.

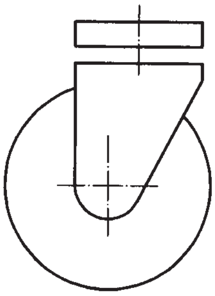


Figure 31 — Swivel castor

3.1.3
twin-wheel castor

assembly, swivel or fixed, including two wheels which are free to revolve independently

See Figure 32.

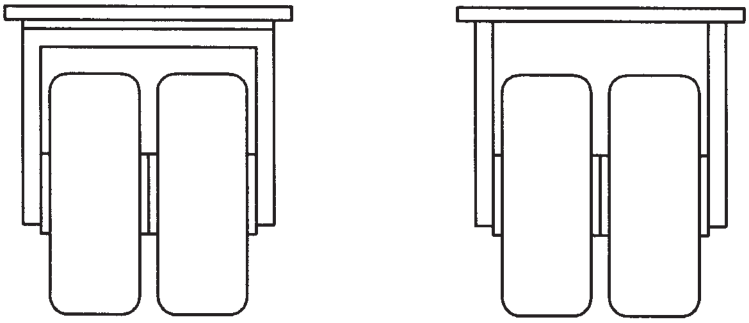


Figure 32 — Swivel and fixed twin-wheel castors

3.1.4
inclined axle castor

assembly on a swivel **housing** (3.2.1) which rotates freely around its vertical axis

NOTE The axis of the wheel is offset to the **swivel axis** (3.2.4), which is inclined to the ground.

See Figure 33.

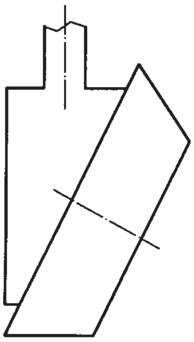


Figure 33 — Inclined axle castor

3.2 Housing and its constituent parts

3.2.1
housing

swivel or fixed assembly, designed to be connected to the equipment, suitable for the fitting with wheel(s)

3.2.2
fork

supporting structure with one or more arms designed to accommodate an **axle** (2.1) and wheel(s)

3.2.3
mounting plane

surface of the **castor** (3.1) or **housing** (3.2.1) to be connected to the equipment

3.2.3.1
top plate

upper part of a **housing** (3.2.1), with holes or slots for connection to the equipment

See Figure 34.

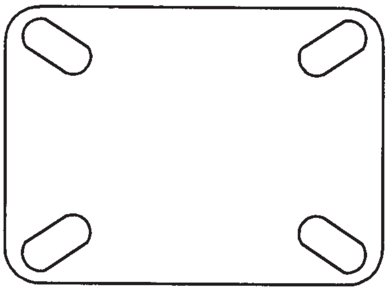


Figure 34 — Top plate

3.2.3.2
stem
vertical upper part of a **housing** (3.2.1) to fit into a socket

See Figure 35.

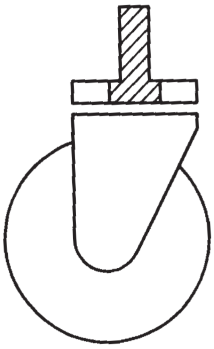


Figure 35 — Stem

3.2.3.3
single bolt hole
through hole on the upper side of the **housing** (3.2.1), suitable for the connection to the equipment

See Figure 36.

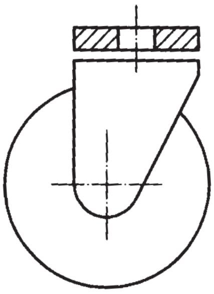


Figure 36 — Single bolt hole

3.2.4
swivel axis
vertical axis around which the **fork** (3.2.2) rotates

3.2.5
swivel bearing
device that allows free rotation of the **fork** (3.2.2) around its **swivel axis** (3.2.4)

3.3 Accessories

3.3.1
threadguard
non-revolving circular component, assembled on the sides of a wheel to protect the **hub** (1.1.2) from threads and other foreign objects which may prevent the wheel from revolving freely

3.3.2
braking and/or locking device
device to prevent the rotation of the swivel **housing** (3.2.1) around the **swivel axis** (3.2.4), or the rotation of the wheel(s) or both

3.3.2.1
wheel braking and/or locking device
device to prevent the wheel(s) revolving but leaving the **housing** (3.2.1) free to swivel

NOTE This device should be used only as a parking brake.

See Figure 37.

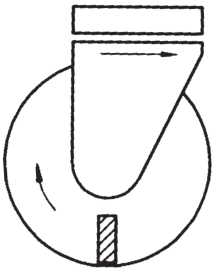


Figure 37 — Wheel braking and/or locking device

3.3.2.2
dynamic brake
device to be used to slow down or stop wheel(s) in motion

NOTE This device can also be used as a parking brake.

See Figure 38.

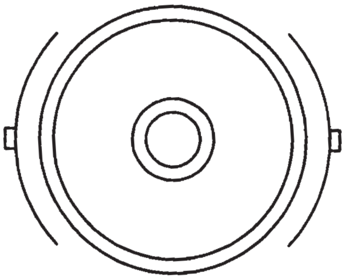


Figure 38 — Dynamic brake

3.3.2.3
central braking and/or locking device
device within the **castor** (3.1) to operate through the **swivel axis** (3.2.4), which prevents the rotation of the swivel **housing** (3.2.1) or the wheel(s), or both

NOTE This device should be used only as a parking brake.

3.3.2.4
total braking and/or locking device
device to prevent simultaneously rotation of the wheel(s) and rotation of the swivel **housing** (3.2.1)

NOTE This device should be used only as a parking brake.

See Figure 39.

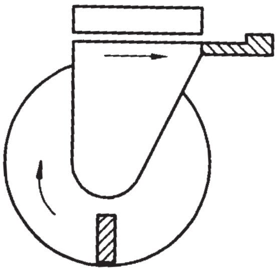


Figure 39 — Total braking and/or locking device

3.3.2.5
directional locking device

device to prevent the rotation of the **fork** (3.2.2) of a **swivel castor** (3.1.2) in one or more predetermined positions

NOTE This device is normally used to convert a swivel castor to a **fixed castor** (3.1.1).

See Figure 40.

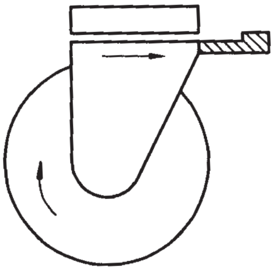


Figure 40 — Directional locking device

3.3.2.6
braking device for office chairs

device to prevent automatically the wheel(s) revolving when the chair is unloaded

See Figure 41.

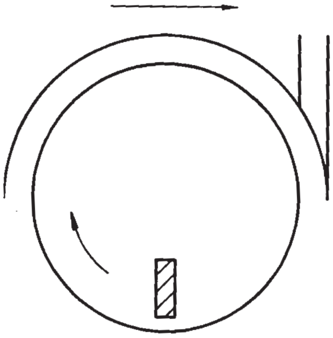


Figure 41 — Braking device for office chairs

3.3.2.7
braking and/or locking device for use on travelators

device to prevent automatically the wheel(s) revolving when placed on a travelator belt

3.3.2.8
central braking and/or locking device for hospital beds

device to control the **castor** (3.1) by means of a mechanism through the **stem** (3.2.3.2), allowing three alternative functions: total braking/locking as in 3.3.2.4, directional locking device as in 3.3.2.5 or no braking/locking action of the swivel **fork** (3.2.2) and wheel(s)

See Figure 42.

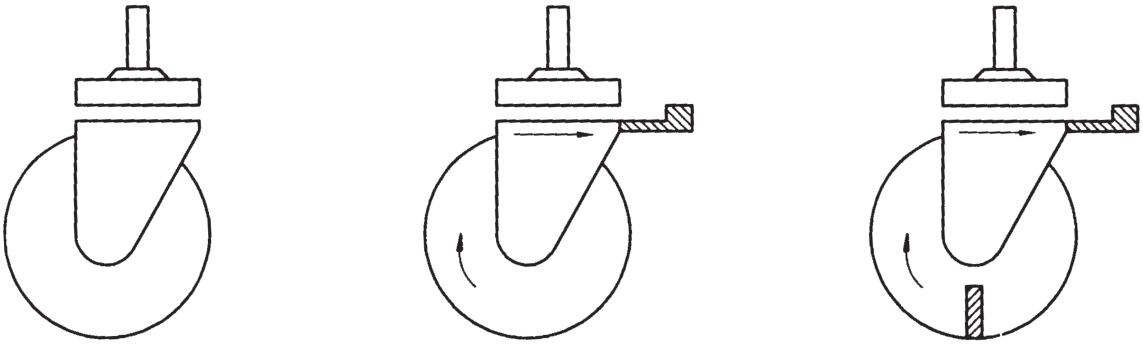


Figure 42 — Central braking and/or locking device for hospital beds

3.3.3
shock-absorbing castor

castor (3.1) to absorb shocks and impacts

See Figure 43.

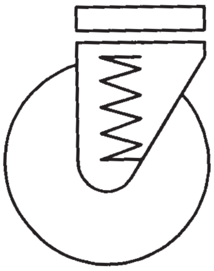


Figure 43 — Shock-absorbing castor

3.3.4
steering attachment

device for the rotation of the swivel **housing** (3.2.1) without **offset** (3.4.2)

See Figure 44.

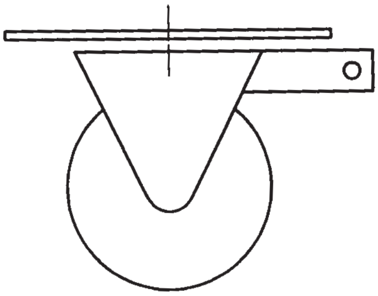


Figure 44 — Steering attachment

3.3.5
foot guard

device, integral with the **fork** (3.2.2), to protect feet

See Figure 45.

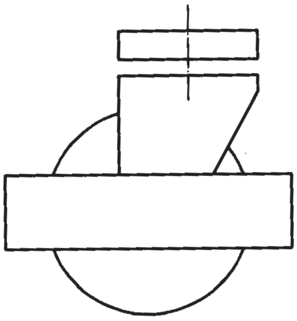


Figure 45 — Foot guard

3.3.6
wheel hood

device to cover the wheel

See Figure 46.

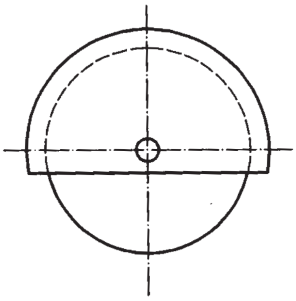


Figure 46 — Wheel hood

3.3.7
twin-wheel castor with a pivoting axle

twin-wheel castor (3.1.3) on a **stub axle mounting** (2.2.2) with a central fulcrum

See Figure 47.

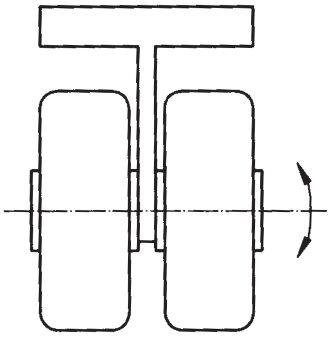


Figure 47 — Twin-wheel castor with a pivoting axle

3.4 Principal dimensions

3.4.1
overall height

h

distance, measured vertically, between the ground and the **mounting plane** (3.2.3) of a **castor** (3.1)

See Figure 48.

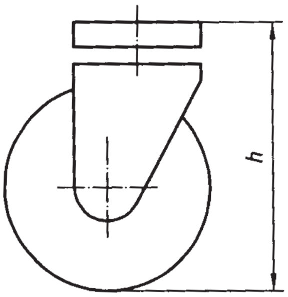


Figure 48 — Overall height

3.4.2
offset

d_F

distance, measured horizontally, between the vertical **swivel axis** (3.2.4) of the **castor** (3.1) and the axis of the wheel(s)

See Figure 49.

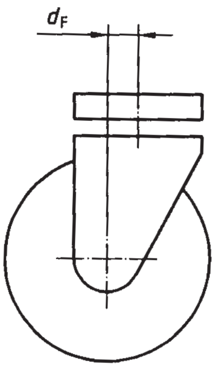


Figure 49 — Offset

3.4.3
swept radius

r_m

distance, measured horizontally, between the vertical **swivel axis** (3.2.4) and the most protruding point of the **castor** (3.1) or its **accessories** (3.3)

NOTE This radius defines the minimum circle in which the castor is free to rotate through 360°.

See Figure 50.

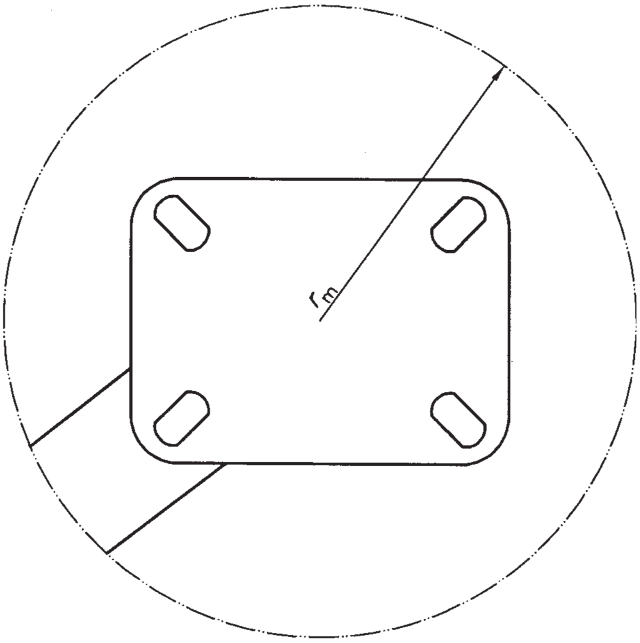


Figure 50 — Swept radius

3.4.4
fork width

b_f

distance between the inner surface of the arms of the **fork** (3.2.2), measured along the revolving **axle** (2.1) of the wheel(s)

See Figure 51.

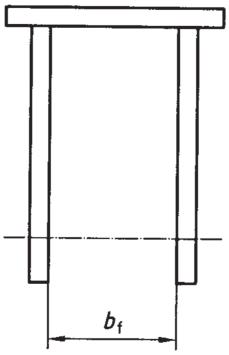


Figure 51 — Fork width

3.4.5 Top plate dimensions

3.4.5.1

top plate outer dimensions

$d \times d$ or $l \times b$

dimensions of the four-sided geometrical figure which contains the **top plate** (3.2.3.1)

See Figure 52.

NOTE The symbols $A \times A$ (square/triangular) and $A \times B$ (rectangular) may be used in place of the recommended symbols stated above as these are in common use within the trade.

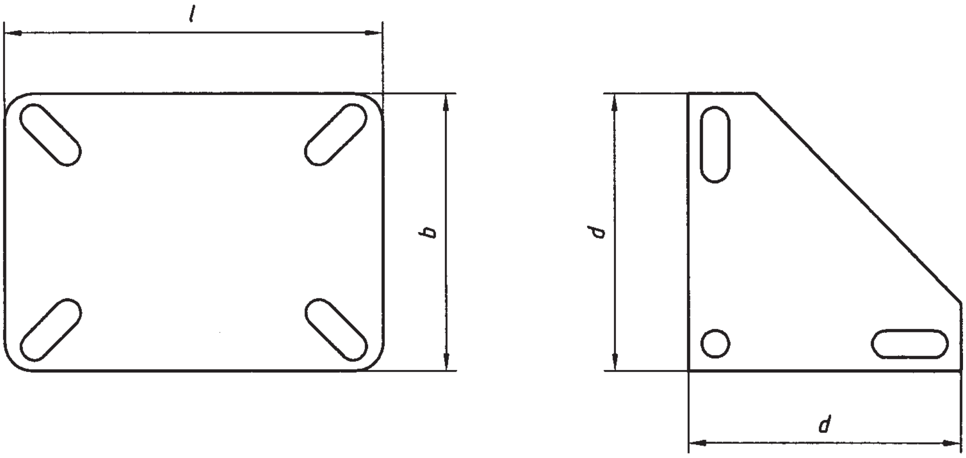


Figure 52 — Top-plate outer dimensions

3.4.5.2

fixing bolt diameter

D_{G1}

diameter of the fixing bolts used to connect the **castor** (3.1) to the equipment through the round or slotted holes in the **top plate** (3.2.3.1)

3.4.5.3
bolt hole spacing

$d' \times d'$ or $d_l \times d_b$

distance between the axes of the **top plate** (3.2.3.1) bolt holes

See Figure 53.

NOTE The symbols $a \times a$ (square/triangular) and $a \times b$ (rectangular) may be used in place of the recommended symbols stated above as these are in common use within the trade.

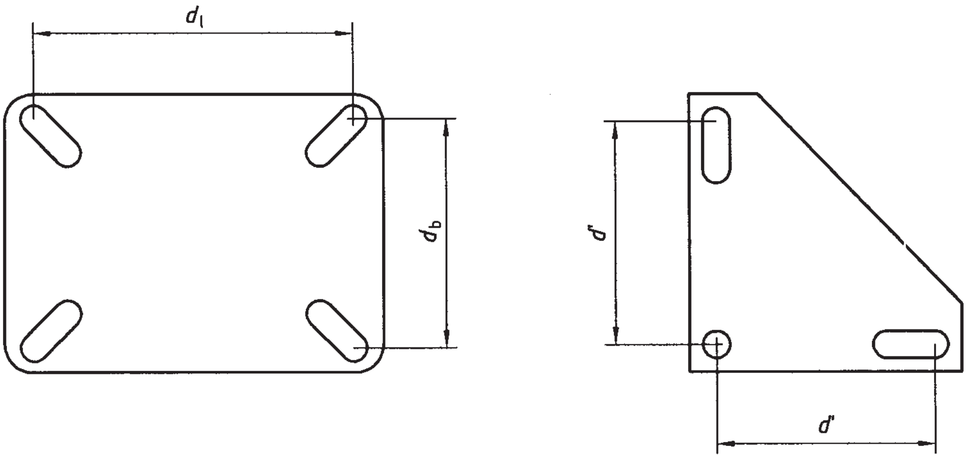


Figure 53 — Bolt hole spacing

3.4.6 Stem dimensions

3.4.6.1
stem diameter

D_P

diameter of the **stem** (3.2.3.2)

See Figure 54.

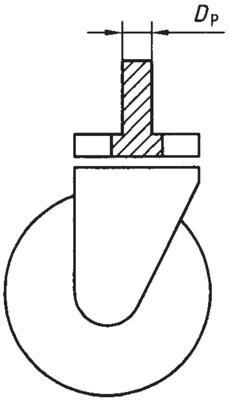


Figure 54 — Stem diameter

3.4.6.2
stem length

l_Q

length of the **stem** (3.2.3.2) above the **mounting plane** (3.2.3)

See Figure 55.

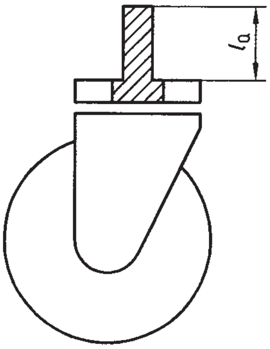


Figure 55 — Stem length

3.4.7
single bolt fixing diameter

D_{G2}

diameter of the bolt used to connect the **castor** (3.1) to the equipment through a **single bolt hole** (3.2.3.3)

See Figure 56.

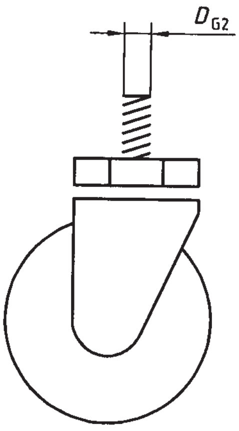


Figure 56 — Single bolt fixing diameter

4 Load capacity and mass

4.1
load capacity
maximum load that can be carried by a wheel or a **castor** (3.1) so as to comply fully with the required acceptance criteria

NOTE Figure 57 shows the symbol for load capacity.

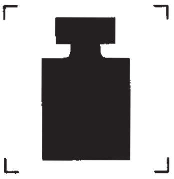


Figure 57 — Symbol for load capacity

4.2
mass
mass of the wheel or **castor** (3.1)

NOTE Figure 58 shows the symbol for mass.

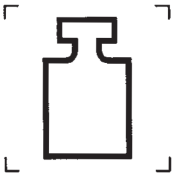


Figure 58 — Symbol for mass

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[2] ISO 22879, *Castors and wheels — Requirements for castors for furniture*

[3] ISO 22880, *Castors and wheels — Requirements for castors for swivel chairs*

[4] ISO 22881, *Castors and wheels — Requirements for use on manually propelled equipment for institutional applications*

[5] ISO 22882, *Castors and wheels — Requirements for castors for hospital beds*

[6] ISO 22883, *Castors and wheels — Requirements for applications up to 1,1 m/s (4 km/h)*

[7] ISO 22884, *Castors and wheels — Requirements for applications over 1,1 m/s (4 km/h) and up to 4,4 m/s (16 km/h)*

Symbols list

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b_T 1.3.5
b_T1 1.3.5.1
b_T2 1.3.5.2
b_T3 1.3.5.3
D 1.3.1
$d \times d$ 3.4.5.1
$d' \times d'$ 3.4.5.3
D_d 1.3.3
d_F 3.4.2
D_G1 3.4.5.2
D_G2 3.4.7
$d_\mathrm{l} \times d_\mathrm{b}$ 3.4.5.3
D_M 1.3.2
D_P 3.4.6.1
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